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A taxonomic review of the genus *Phrealcia* Chrétien, 1900 with description of a new species from Korea (Lepidoptera: Ypsolophidae)

J.-C. Sohn

Abstract

An Ypsolophid genus, *Phrealcia* Chrétien, 1900 is reviewed with four described species and a new species from Korea, *P. pumba* Sohn, sp. n. Lectotypes of *Calantica eximiella* Rebel, 1899 and *Procalantica ussuriensis* Rebel, 1901 are designated and both species are redescribed. *Rhabdocosma* Meyrick, 1935 is synonymized with *Phrealcia* and redefined as a subgenus of *Phrealcia*, including only the type species, *R. aglaophanes* Meyrick, 1935. Two other species of *Rhabdocosma*, *R. dolini* Gershenson, 2003 and *R. nematopogonites* Sohn, 2014 are combined in the subgenus *Phrealcia*. A key to the world species of *Phrealcia* is provided. A revised status of *Phrealcia* and *Rhabdocosma* is discussed. The type specimens, adult habitus and genitalia of the subgenus *Phrealcia* are provided, when available.

KEY WORDS: Lepidoptera, Ypsolophidae, *Phrealcia*, new species, taxonomy, Korea.

Una revisión taxonómica del género *Phrealcia* Chrétien, 1900 con descripción de una nueva especie de Corea (Lepidoptera: Ypsolophidae)

Resumen

Se revisa un género de ypsolófido, *Phrealcia* Chrétien, 1900 con cuatro especies descritas y una nueva especie para Corea, *P. pumba* Sohn, sp. n. Se designan los lectotipos de *Calantica eximiella* Rebel, 1899 y *Procalantica ussuriensis* Rebel, 1901 y se describen ambas especies. *Rhabdocosma* Meyrick, 1935 es sinonimizado con *Phrealcia* y se redefine como subgénero de *Phrealcia*, incluyendo sólo la especie tipo, *R. aglaophanes* Meyrick, 1935. Otras dos especies de *Rhabdocosma*, *R. dolini* Gershenson, 2003 y *R. nematopogonites* Sohn, 2014 son combinadas en el subgénero *Phrealcia*. Se propone una clave de las especies mundiales de *Phrealcia*. Se discute una revisión del estatus de *Phrealcia* y *Rhabdocosma*. Se proponen, cuando están disponibles, las especies tipo, adultos, hábitos y genitalia del subgénero *Phrealcia*.

PALABRAS CLAVE: Lepidoptera, Ypsolophidae, *Phrealcia*, nueva especie, taxonomía, Corea.

Introduction

Phrealcia Chrétien, 1900, was originally proposed as a subgenus of *Cerostoma* Latreille, 1802, now *Ypsolopha* Latreille, 1796, with the type species, *Cerostoma brevipalpella* Chrétien, 1900. Prior to this, the same species was described as *Calantica eximiella* by REBEL (1899) who thought that it was related to an yponomeutid genus, *Calantica*. REBEL (1901) found another species related to *C. eximiella*. Since these two species were different from typical *Calantica*, REBEL (1901) designated a new genus, *Procalantica*. This genus was later synonymized with *Phrealcia* by REBEL (1907). FRIESE (1960) revised the systematic position of *Phrealcia* and confirmed its Ypsolophid association, followed by KYRKI (1990) and MEY (2013).

Phrealcia comprises four Palearctic species: *P. eximiella* Rebel, 1899 from southern Europe; *P. friesei* Mey, 2013 from Turkey; *P. steueri* Mey, 2013 from Xinjiang, China; and *P. ussuriensis* Rebel, 1901 from Far Eastern Russia. These are medium-sized moths whose wings are white or pale gray, sometimes with fuscous markings. CHRÉTIEN (1900) briefly characterized the genus based on the wing shape and venation which are not enough to distinguish it from other Ypsolophids. MEY (2013) distinguished the genus from *Ypsolopha* by the lack of a scale tuft on the short labial palpus. This character state is shared with *Rhabdocosma* Meyrick, 1935, which currently includes three described species (SOHN & GERSHENSON, 2014). In fact, there is no clear-cut distinction between *Phrealcia* and *Rhabdocosma* in morphological features. Therefore, their synonymy is established from this study, bringing the total species number of *Phrealcia* to eight. All the species of *Phrealcia* are quite rare and very little is known about their biology. BURMANN (1980, 1981) reported the detailed larval feeding habits of *P. eximiella* on *Lonicera* (Caprifoliaceae). Larvae of *Rhabdocosma aglaophanes* Meyrick feed on Celastraceae and Caprifoliaceae in Japan (MORIUTI, 1977; OKU, 2003).

The aims of this article are to describe a new species of *Phrealcia* from Korea, to report a new record of *P. ussuriensis* from China, to evaluate the relationship between *Phrealcia* and *Rhabdocosma*, and to provide a key to all the congeners.

Materials and methods

Specimens were obtained from the following institutional collections.

BMNH:	The Natural History Museum (formerly British Museum (Natural History)), London, UK;
CBNU:	Department of Plant Medicine, Chungbuk National University, Cheongju, South Korea;
IZCAS:	Institute of Zoology, Chinese Academy of Sciences, Beijing, China;
MNHU:	Museum für Naturkunde, Humboldt-Universität, Berlin, Germany;
NHMW:	Naturhistorisches Museum Wien, Vienna, Austria;
USNM:	U.S. National Museum of Natural History, Washington DC, USA.

Genitalia dissection follows CLARKE (1941), except that chlorazol black was used for staining and Euparal resin for permanent slide mounting. Wing-slides were prepared following HODGES (2005). Pinned specimens were examined with a Leica MZ APO stereoscope. Slide-mounted specimens were examined with a Leica LEITZ-DMRX microscope. Terminology follows KLOTS (1970) for genitalia and WOOTTON (1979) for wing venation. Eighth and ninth sternites are abbreviated as S8 and S9 respectively. Ovipositor is defined as a structure comprising the eighth and ninth abdominal segments, an inter-segmental membrane, and papillae anales. Verbatim label data are given only for primary types and therein a vertical line (|) indicates a line break. In the label data, the 'GSN' in brackets denotes the genitalia slide number.

Systematic accounts

Phrealcia Chrétien, 1900: 90.

Type species: *Cerostoma brevipalpella* Chrétien, 1900, by monotypy.

= *Procalantica* Rebel, 1901: 161.

Type species: *Procalantica ussuriensis* Rebel, 1901, by original designation.

= *Rhabdocosma* Meyrick, 1935: 603, **syn. n.**

Type species: *Rhabdocosma aglaophanes* Meyrick, 1935, by monotypy.

Phrealcia is similar to *Ypsolopha* but differs from the latter in lacking a scale tuft on the 2nd segment of labial palpus (MEY, 2013). General features of *Phrealcia* include: the head vestiture rough with piliform scales; ocellus present; antennae filiform in both sexes; labial palpi small, slender, porrect, acuminate apically (Figs. 6-8); wing venation (Figs. 1-2) similar to *Ypsolopha*;

forewing pterostigma absent; forewing accessory cell present or absent (in *P. steurei*); S8 very small; pleural lobes semicircular (Figs. 4-5); male genitalia similar to *Ypsolopha*; socii elongate, slender, tapered to apex; tegumen subtriangular on top, with lateral arms nearly parallel and dorsocephalic margin shallowly emarginated medially; female ovipositor telescopic, with two subdivisions; female S9 with an elongate sclerite bifid posteriorly, each projection sparsely setose; papillae anales semiglobular basally, narrower to apex; apophyses anteriores diverged into two branches basally, one branch longer than the other; antrum small, ring-shaped, open one-side; inception of ductus seminalis near antrum; signum on caudal part of corpus bursae as a scobinate band or absent (in *P. friesei*).

Included species

Subgenus *Phrealcia* Chrétien, 1900

Phrealcia dolini (Gershenson, 2003), **comb. n.**

Phrealcia eximiella (Rebel, 1899)

Phrealcia friesei Mey, 2013

Phrealcia nematopogonites (Sohn, 2014), **comb. n.**

Phrealcia steuri Mey, 2013

***Phrealcia pumba* Sohn, sp. n.**

Phrealcia ussuriensis (Rebel, 1901)

Subgenus *Rhabdocosma* Meyrick, 1935, **stat. rev.**

Phrealcia aglaophanes (Meyrick, 1935) **comb. n.**

Key to the species of *Phrealcia* based on external and genital characters

1. Antennae covered with dense scales *P. aglaophanes* (Meyrick)
- Antennae filiform 2
2. Forewing white with no markings *P. friesei* Mey
- Forewing white with brown markings or grayish brown with or without markings 3
3. Forewing narrow, with termen greatly oblique *P. steuri* Mey
- Forewing broad, with termen slightly oblique 4
4. Forewing without markings 5
- Forewing with markings 7
5. Hindwing darker than forewing ***P. pumba* Sohn, sp. n.**
- Hindwing paler than forewing 6
6. Forewing dark grayish brown; male valva broad, weakly bulged at distal 1/3 *P. dolini* (Gershenson)
- Forewing purplish brown; male valva narrow, weakly bulged at distal 1/5 *P. nematopogonites* (Sohn)
7. Male gnathos with large medial plate; female signum 1/2 as long as corpus bursae *P. eximiella* (Rebel)
- Male gnathos with small medial plate; female signum 1/3 as long as corpus bursae ... *P. ussuriensis* (Rebel)

Subgenus *Phrealcia* Chrétien, 1900

Members of the subgenus *Phrealcia* differ from *P. (Rhabdocosma) aglaophanes* in having at longer saccus and smaller cornutal spines in the male genitalia and lacking the dense scales on the antennae.

Phrealcia (Phrealcia) dolini (Gershenson, 2003), **comb. n.**

Rhabdocosma dolini Gershenson, 2003: 93. Type locality: Madagascar, Central Plateau, Park Perinet.

GERSHENSON (2003) already described this species in detail. The type specimen was illustrated by SOHN & GERSHENSON (2014). No additional specimens were found from this study.

Distribution: Madagascar.

Phrealcia (Phrealcia) eximiella (Rebel, 1899) (Figs. 5, 8, 9, 15, 19)

Calantica eximiella Rebel, 1899: 176. Type locality: Italy, Trafoi.

Phrealcia brevipalpella Chrétien, 1900: 90. Type locality: France, Alpes-de-Haute-Provence, Barcelonnette. Synonymized by REBEL (1907).

Procalantica eximiella; Rebel, 1901: 161.

Phrealcia eximiella; Rebel, 1907: 96.

Type: Lectotype of *Calantica eximiella* (designated here) - female, "I. Trafoi | Juli 871. [= July 1871]" [hand-written], "TYPE [in black line box]" [red label], "Rogenhofer" [hand-written on label with black line along upper and right margins], "Zeller | vidit | 1879" [hand-written], "33" [hand-written], "*Calantica | eximiella* Rbl. | Type [in red]" [hand-written], "Mus. Wien" [hand-written], "502", "15,601 [hand-written] | Mus. Vind. | Gen. Präp.". Deposited in NHMW.

Materials examined: 1 ♂, 1 ♀, France, Alpes-de-Haute-Provence (= Basses Alpes), Barcelonnette, Vlard, 16-21-VI-1900 (Paravicini), [GSN] BM-32865 (♀), 32875 (♀), BMNH. 1 ♂, Italy, South Tyrol, Stils, Gomagoi, 16-30-VI-1928 (H. Amsel), [GSN] BM-32877, BMNH. 1 ♀, "Grdey [?]", 28-VI-1931, [GSN] BM-32876, BMNH. 1 ♀, Austria, Hütto, Lechtal Alps (alt. 1200 m), 20-VII-1899, [GSN] USNM-115132, USNM.

Redescription: Head (Fig. 8) - Vertex and frons pale yellow. Antennae 2/3 as long as forewing; scape brownish white; flagellomere dark grayish brown, with white band distally. Labial palpi 1.3 x longer than antennal scape; 1st segment 1/3 as long as 2nd, pale yellow; 2nd segment as long as 3rd; 2nd and 3rd segments pale yellow, intermixed with pale brown scales.

Thorax: Patagium and mesonotum pale grayish brown, intermixed with brownish white scales in males, pale yellow in females; tegulae pale grayish brown in males, pale yellow, intermixed with pale grayish brown scales on basal half in females. Fore- and midlegs with coxa, femur, and tibia dark grayish brown on outer surface, brownish white on inner surface; tarsomere dark brown with a brownish white ring distally. Hindlegs with coxa, femur, and tibia pale brown; tarsomere dark brown, with a brownish white ring distally. Forewing (Fig. 9) length 7.2-9.1mm (n = 4), brownish white, suffused with dark brown scales on entire area in males, sparsely intermixed with dark grayish brown scales in females; subbasal line double, dark brown, very narrow, intermittent, angulated at middle, ambiguous in males; a dark brown spot at basal 2/5 of CuP fold in females; antemedian line dark brown, intermittent, very narrow, nearly straight, merged to median line in males; median line dark brown, broad, sinuous, diffused to background suffusion in males; postmedian and submarginal lines dark brown, only on costal and dorsal area, converged to tornus in females; marginal line dark brown, diffused in males, as dashes in females; fringe dark brownish gray in males; brownish white, alternating with dark brown along terminal dashes in females. Hindwing and fringe pale brownish gray.

Male genitalia (Fig. 15): Uncus emarginated posteriorly; socii tapered to apex, slightly curved at apical 1/5, 2/3 as long as saccus. Tegumen rectangular, 1.5 x longer than saccus; gnathos with thorny, linguiform medial plate. Valva slightly broadened to apex; apex round; costa slightly bulged at distal 1/4; sacculus 2/3 as long as valva. Saccus elongate, slender. Aedeagus (Fig. 15a) nearly straight; caecum 1/3 as long as the remaining part of aedeagus; vesica with two bundles of spinulate cornuti.

Female genitalia (Fig. 19): Ovipositor 2 x longer than S8; apophyses posteriores 1.5 x longer than apophyses anteriores. Ductus bursae bowl-shaped in caudal 1/5, broadened to corpus bursae, granulate. Corpus bursae ovate; signum as scobinate band, 1/2 as long as corpus bursae.

Distribution: Austria, France, Italy, Spain, and Switzerland.

Remarks: REBEL (1899) described *Calantica eximiella* based on two female syntypes. Only one of those specimens is still extant in the NHMW and the other one collected from "Stilsfer Joch" cannot be traced. The lectotype of *C. eximiella* is designated with the extant syntype.

Phrealcia (Phrealcia) friesei Mey (Fig. 13)

Phrealcia friesei Mey, 2013: 54. Type locality: Turkey, Andana Prov., Saimbeyli.

MEY (2013) already described the species in detail. No additional specimens were found from this study.

Distribution: Turkey.

Phrealcia (Phrealcia) nematopogonites (Sohn, 2014), **comb. n.** (Figs. 4, 7)

Rhabdocosma nematopogonites Sohn, 2014: 357, in Sohn & Gershenson. Type locality: Japan, Honshu, Nagano Pref., Tobira.

The detailed description of this species can be found in SOHN & GERSHENSON (2014). No additional specimens have been found from this study.

Distribution: Japan (Honshu).

Phrealcia (Phrealcia) steueri Mey (Fig. 14)

Phrealcia steueri Mey, 2013: 53. Type locality: China, Xinjiang, Bogdo-Shan.

MEY (2013) already described the species in detail. No additional specimens were found from this study.

Distribution: China (Xinjiang).

***Phrealcia (Phrealcia) pumba* Sohn, sp. n.** (Figs. 12, 20)

Type: Holotype female, “KOREA, Chungbug | Danyang, Jangwoi-ri | Mt. Jebibong | 10-June-2002 | Leg. J. Sohn”, “Genitalia slide | SJC-621 | ♀ J. C. Sohn” [purple label with black border lines]. Deposited in CBNU.

Description: Head - Vertex brownish white; frons dark grayish brown, sparsely intermixed with brownish white scales. Antennae 1/2 as long as forewing; scape brownish white, tinged with dark brown distally; 1st to 3rd flagellomeres dark grayish brown in basal half, brownish white in distal half; remaining flagellomeres dark grayish brown in basal 2/3, brownish white in distal 1/3. Labial palpi brownish white, scales tinged with dark brown distally; 1st segment 1/2 as long as 2nd; 2nd segment as long as 3rd.

Thorax: Patagium pale brown; tegulae and mesonotum brownish white, intermixed with pale grayish brown scales. Fore- and midlegs with coxa brownish white, sparsely intermixed with pale grayish brown scales; femur grayish brown dorsally and laterally, brownish white ventrally; tibia and 1st tarsomere grayish brown dorsally, brownish white ventrally and distally; remaining tarsomeres grayish brown, with a brownish white ring. Forewing (Fig. 12) length 10.3 mm (n = 1), elongate, subrectangular, apex narrowly round, termen oblique, brownish white, densely peppered with dark brown scales in anterior 2/3, sparsely intermixed with dark brown scales in posterior 1/3; fringes brownish white. Hindwings and fringes grayish brown.

Male genitalia: Unknown.

Female genitalia (Fig. 20): Apophyses posteriores 2 x longer than apophyses anteriores. Ostium bursae 3 x broader than antrum. Ductus bursae infundibulate in posterior 1/7, gradually broadened to corpus bursae; antrum at posterior 1/7 of ductus bursae. Corpus bursae ovate, as long as ductus bursae; signum 2/3 as long as corpus bursae, scobinate, slightly broadened at posterior 1/4.

Distribution: South Korea.

Remarks: This species is similar to another East Asian congener, *P. ussuriensis*, but differs from the latter in having dense brown peppering on the female forewings (nearly white with dark brown markings in *P. ussuriensis*) and the shorter signum in the female corpus bursae.

Etymology: The species epithet, ‘*pumba*’, is a Korean traditional term indicating the poor or beggars and refers to the dusty forewings of the new species resembling the clothes of those people.

Phrealcia (Phrealcia) ussuriensis (Rebel) (Figs. 1, 10, 11, 16, 21)

Procalantica ussuriensis Rebel, 1901: 162. Type locality: Russia, Primorsky Krai, Suchan.

Phrealcia ussuriensis; Rebel, 1907: 97.

Types: Lectotype (designated here) - male, "Origin" [pink label], "Sut- | Schan." [hand-written on pale purple label], "*Proc.* Type [in red] | *ussuriensis* Rbl." [hand-written], "*Procalantica* | n. g. | *Ussuriensis* | Rbl." [hand-written], "469", "*Phrealcia* | *ussuriensis* | Rebe [lines up to here hand-written] | Dr. G. Friese det. 1965 | Lectotypus [in red block] ♂" [label with red-lined margins], "♂ Genital - Präp. | Friese 469 [hand-written]". Deposited in MNHU. Paralectotypes (1 ♂, 2 ♀♀): 1 ♀, same collecting data as holotype, MNHU; 1 ♂, 1 ♀, "Ussuri", 1900 (Staudinger), NHMW.

Materials examined: 2 ♂♂, China, Heilongjiang Prov., Wuying, 9-10-VI-1981 (JW Bai), [GSN] IOZ-09043, WSN: IOZ-09044, IZCAS; 1 ♂, 1 ♀, Russia, "Amur, East Siberia", 1906 (Staudinger), "71006 [♂]" and "71007 [♀]", [GSN] BM-32028 (♂), 32029 (♀), BMNH.

Description: Head - Vertex and frons white. Antenna 1/2 as long as forewing; scape white; flagellomeres dark brown, annulated with white. Labial palpi as long as maximum diameter of eye, white, intermixed with brownish white scales on 3rd segment; 1st segment 1/2 as long as 2nd, 2nd segment as long as 3rd.

Thorax: Patagium white; tegula white, intermixed with pale brown scales; mesonotum white, sparsely intermixed with brownish white scales. Foreleg and midleg dark brown, densely intermixed with white scales ventrally; tarsomeres with a white band distally. Hindleg with coxa to tibia brownish white; tibia tinged with pale brown distally, with dense piliform scales ventrally; tarsomeres dark grayish brown, with a white band distally. Forewing (Figs. 10-11) length 7.2-8.2 mm (n = 4), costa strongly arched basally, termen moderately oblique, apex round, white, suffused with grayish brown throughout but intensified to costa and around median line, apex and tornus (intensity of grayish brown suffusion variable, depending on individual); dark brown spot present on 1/2 of lower stem of discal cell; fringes dark grayish brown except above apex and around tornus. Hindwing broad, pale brownish gray, paler to base; fringes pale brownish gray.

Abdomen: Tergites brownish white, tinged with dark brownish gray along distal margin; sternites brownish white.

Male genitalia (Fig. 16): Uncus rectangular; socius with a small, hooked spine apically. Tegumen 2/3 as long as valva; gnathos with small, semicircular medial plate. Valva 2 x longer than gnathos, round apically; costa entire, slightly broadened in basal 1/3; sacculus narrow. Saccus 2.5 x longer than socius, slender, bent. Aedeagus slightly curved; caecum 1/3 as long as the remaining part of aedeagus; two narrow, spinulate cornutal bands in distal half, with larger spinules at distal ends.

Female genitalia (Fig. 21): Apophyses posteriores 1.7 x longer than apophyses anteriores. Ostium bursae 2.5 x broader than antrum. Ductus bursae bowl-shaped in posterior 1/7, broadened in anterior 1/5, granulate except posterior 2/7; antrum at posterior 1/7 of ductus bursae. Corpus bursae ovate, 2/3 as long as ductus bursae; signum as scobinate band, 1/3 as long as corpus bursae, of even width.

Distribution: China (Heilongjiang), Russia (Primorsky).

Remarks: REBEL (1901) mentioned that the type series of *Procalantica ussuriensis* comprise a pair of specimens from the Staudinger collection (now a part of the MNHU collection) and another pair from the NHMW. He then referred the specimens from the MNHU to "types" and others from the NHMW to "cotypes". Since there are two specimens equivocally referred to type, the type status of *P. ussuriensis* is based on syntypes. Each pair of specimens from these two museums hold lectotype and paralectotype labels independently. These lectotypes and paralectotypes have never been published and thus they are invalid. One of these unpublished paralectotypes was referred and illustrated in MEY (2013). To avoid further confusion, the lectotype of *P. ussuriensis* is designated from this study.

REBEL (1907) and CARADJA (1920) raised the possibility that three species, *P. eximiella*, *P. brevipapella*, and *P. ussuriensis*, may represent a single species. On the other hand, MEYRICK (1914) listed these as three separate species. Synonymy of the former two species has been accepted from subsequent literature (e.g. KARSHOLT & RAZOWSKI, 1996). *Procalantica ussuriensis* was regarded as a separate species from the other two in SINEV (2008) and its distinctiveness is confirmed from this study.

Subgenus *Rhabdocosma* Meyrick, 1935, **stat. n.**

Defining characters of this subgenus include: **i**) the antennae covered with dense scales (denser in females); **ii**); the male saccus short, stout, and **iii**) the male aedeagus with cornuti comprised of paired clusters of seven stout spines.

Phrealcia (*Rhabdocosma*) *aglaophanes* (Meyrick, 1935), **comb. n.** (Figs. 6, 17, 18)

Rhabdocosma aglaophanes Meyrick, 1935: 604. Type locality: Japan, Honshu, Mt. Ryozen.

MORIUTI (1977) provided the external and genital characteristics of both sexes for this species. The specimens of *P. aglaophanes* examined here are consistent with Moriuti's description.

Distribution: Japan and possibly Korea.

Discussion

The lack of scale tuft on the labial palpus has been suggested as a character of *Phrealcia* distinguishing from *Ypsolopha* by MEY (2013). This character state is, however, not unique to *Phrealcia*, but also occurs in *Rhabdocosma*, another genus of Ypsolophidae (MORIUTI, 1977). In fact, a distinction between *Phrealcia* and *Ypsolopha* based on the labial palpi appears unwarranted, as some species of *Ypsolopha* lack an apparent scale tuft on the labial palpus (SOHN & GERSHENSON, 2014).

MORIUTI (1977) indicated three distinctive genital characters that separate *Rhabdocosma* and *Ypsolopha*: **i**) the shape of cornuti in the male aedeagus (two clusters of seven stout spines in *Rhabdocosma*, whereas two needles, each followed by a rod or a spinulate zone in the majority of *Ypsolopha*); **ii**) the caudal and cephalic margins of the tegumen in the male genitalia; and **iii**) the shape of signum in the female corpus bursae (a scobinate band in *Rhabdocosma*, against an elongate band with one or two transverse ridges in *Ypsolopha*). Of these characters, the cornuti of two species of *Rhabdocosma* other than the type species, *R. aglaophanes*, comprise two spinulate bands similar to *Phrealcia* and a few species of *Ypsolopha*. The scobinate, band-like signum of *Rhabdocosma* also occurs in *Phrealcia* except for one species, *P. friesei*. MORIUTI (1977) did not describe the structures of the tegumen unique to *Rhabdocosma* in detail. My examination reveals that *Rhabdocosma* is indeed distinguished from *Ypsolopha* in having the shallower medial emargination on the dorsocephalic margin of the tegumen. This characteristic is, however, shared with *Phrealcia*. Further, the wing venation of *P. ussuriensis* (Fig. 1) is very similar to that of *Rhabdocosma aglaophanes* (Fig. 2). These two species are also similar to *Ypsolopha vittella* (L.) (Fig. 3) in the wing venation but differ from the latter in lacking the forewing pterostigma and having the complete CuP in the hindwings. Accounting for all those shared characteristics between *Rhabdocosma* and *Phrealcia*, both genera are synonymized from this study.

Rhabdocosma aglaophanes, the type species of *Rhabdocosma*, shows some differences in the male genitalia from other congeners and *Phrealcia*, including the antennae covered with dense scales; the male saccus shorter than the socius; the male aedeagus with the caecum smaller than the remaining. This necessitates that *Rhabdocosma* is defined by only the type species. Nonetheless, these differences are not good enough to support the separate generic status of *Rhabdocosma* and *Phrealcia*, because of their homoplacious nature within Ypsolophidae. Therefore, *Rhabdocosma* is redefined as a subgenus of *Phrealcia*, including only the type species and the other two species of *Rhabdocosma* are transferred to subgenus *Phrealcia*.

Members of *Phrealcia* show a disjunctive distribution across the Palearctic Region. MEY (2013) associated this distributional pattern with global glacial cycles which possibly encouraged *Phrealcia* occupying isolated mountains. Including *Rhabdocosma* in *Phrealcia* may indicate another possible pathway which caused their disjunctive distribution. Accounting for *Rhabdocosma* occurring in two separated countries, Japan and Madagascar, SOHN & GERSHENSON (2014) raised a possibility that this distribution may be related with faunal exchanges between Africa and the Indian subcontinent. This hypothesis, however, remained uncertain due to the absence of congeners from the Oriental

Region. Filling the distributional gaps of *Phrealcia* with new species will be a prerequisite to complete their biogeographical history.

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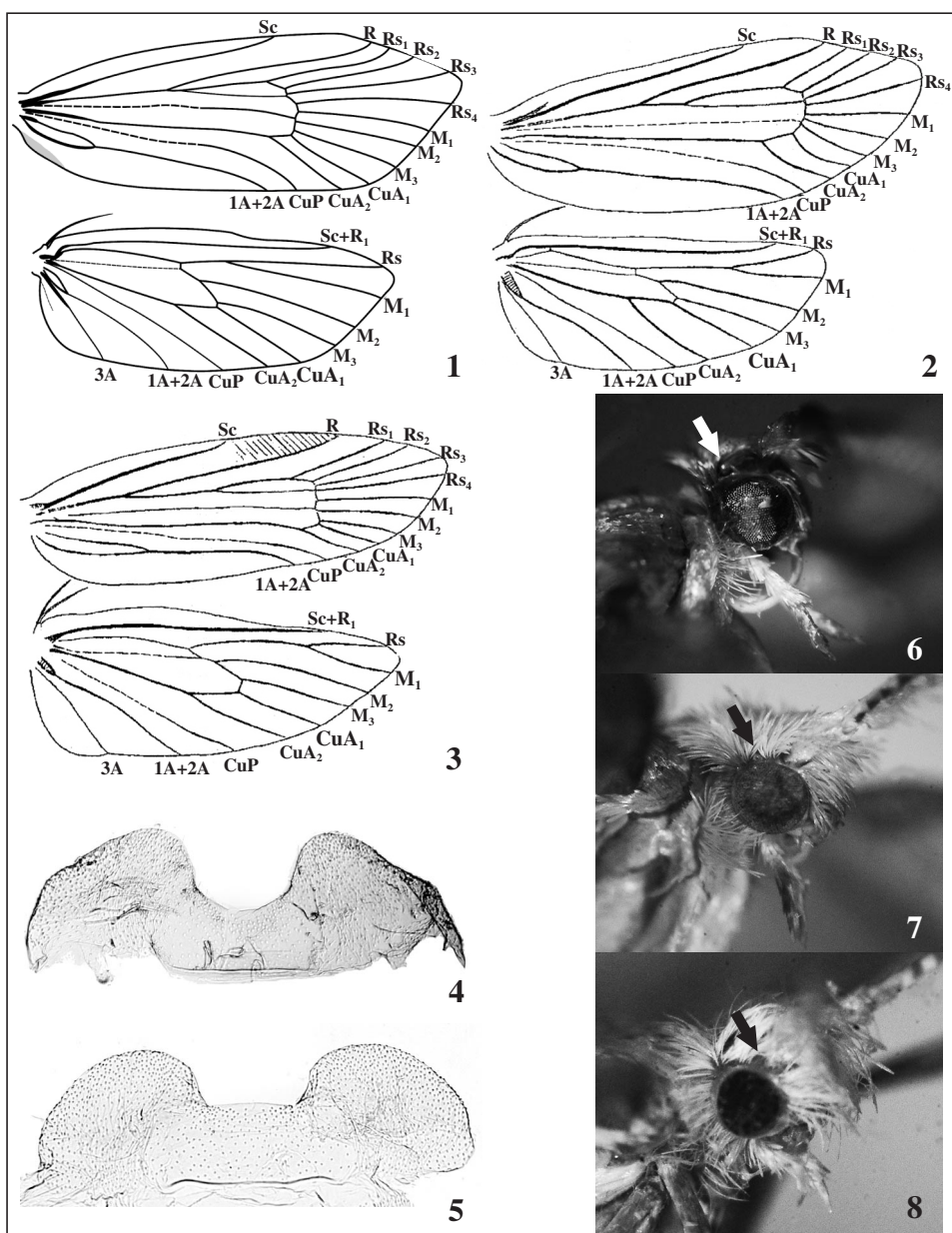
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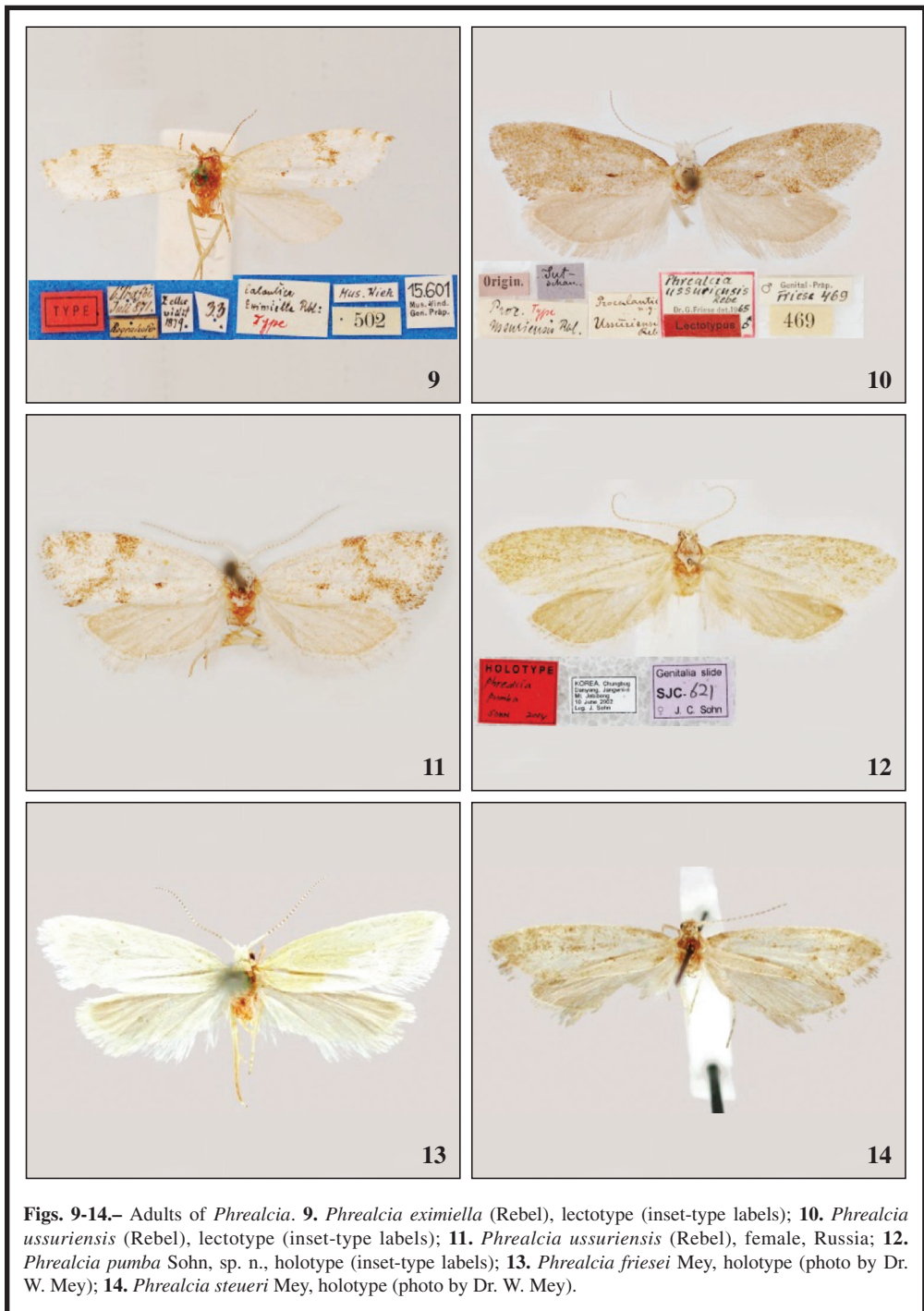
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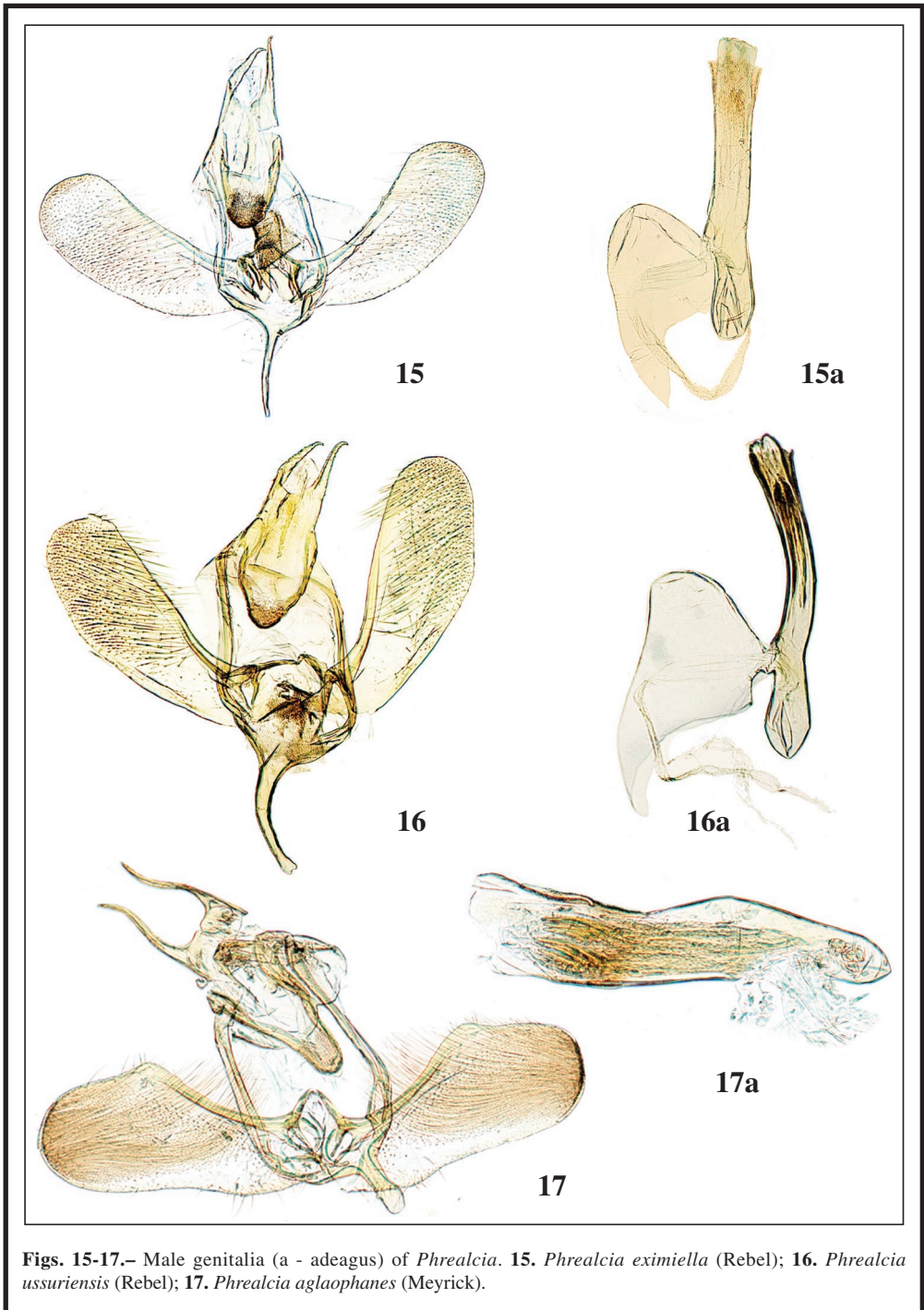
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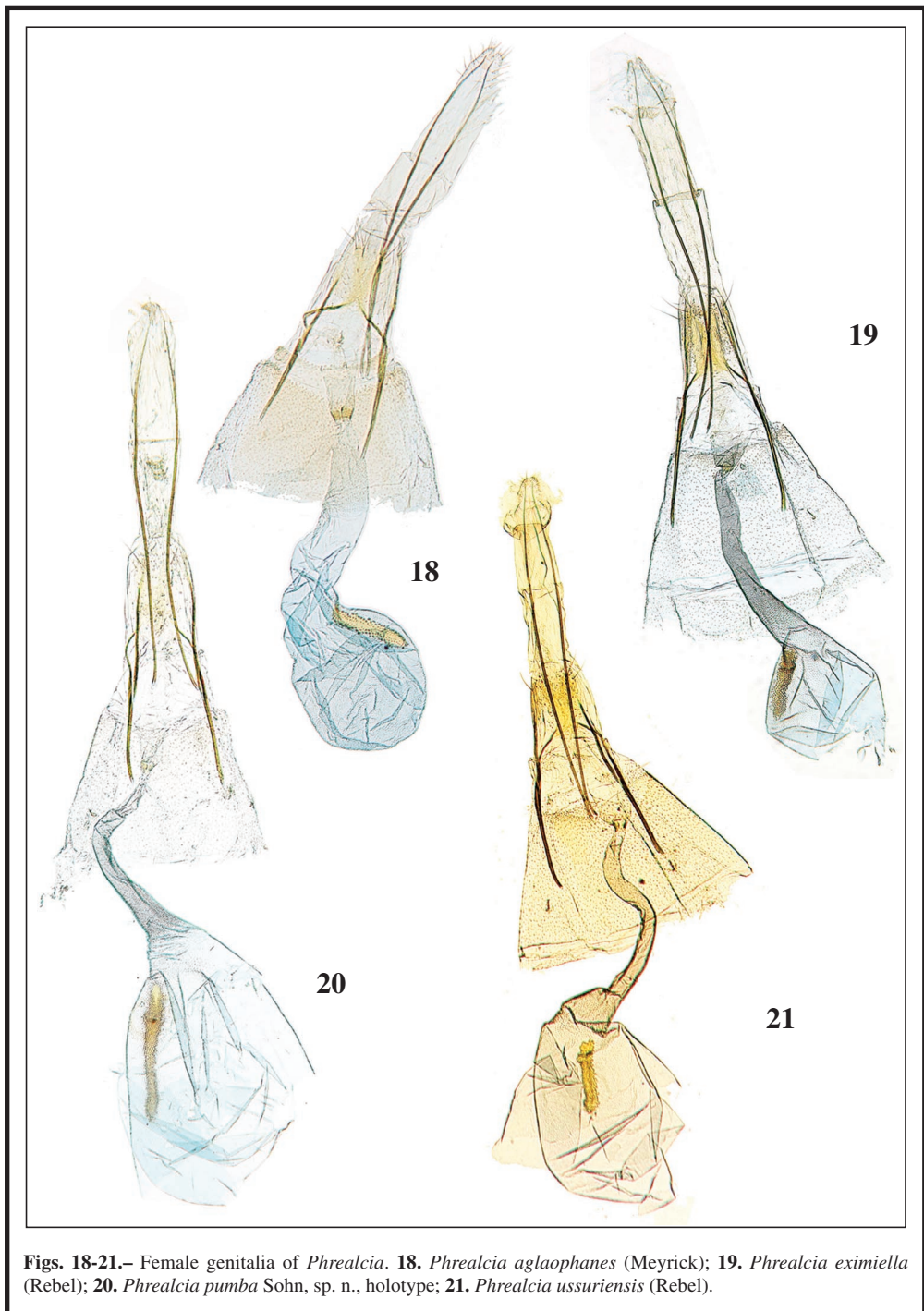
Figs. 1-8.— Wing venation, male pleural lobes, and head of *Phrealcia* and *Ypsolopha*. **1-3.** Wing venation. **1.** *Phrealcia ussuriensis* (Rebel), male; **2.** *Phrealcia aglaophanes* (Meyrick), male (after MORIUTI, 1977); **3.** *Ypsolopha vittella* (Linnaeus), female (after MORIUTI, 1977). **4-5.** Male pleural lobes. **4.** *Phrealcia nematopogonites* (Sohn); **5.** *Phrealcia eximiella* (Rebel). **6-8.** Head (arrow-ocellus). **6.** *Phrealcia aglaophanes* (Meyrick); **7.** *Phrealcia nematopogonites* (Sohn); **8.** *Phrealcia eximiella* (Rebel).



Figs. 9-14.— Adults of *Phrealcia*. **9.** *Phrealcia eximiella* (Rebel), lectotype (inset-type labels); **10.** *Phrealcia ussuriensis* (Rebel), lectotype (inset-type labels); **11.** *Phrealcia ussuriensis* (Rebel), female, Russia; **12.** *Phrealcia pumba* Sohn, sp. n., holotype (inset-type labels); **13.** *Phrealcia friesei* Mey, holotype (photo by Dr. W. Mey); **14.** *Phrealcia steueri* Mey, holotype (photo by Dr. W. Mey).



Figs. 15-17.— Male genitalia (a - aedeagus) of *Phrealcia*. **15.** *Phrealcia eximiella* (Rebel); **16.** *Phrealcia ussuriensis* (Rebel); **17.** *Phrealcia aglaophanes* (Meyrick).



Figs. 18-21.— Female genitalia of *Phrealcia*. **18.** *Phrealcia aglaophanes* (Meyrick); **19.** *Phrealcia eximiella* (Rebel); **20.** *Phrealcia pumba* Sohn, sp. n., holotype; **21.** *Phrealcia ussuriensis* (Rebel).